

REMARKS

Claims 34-36, 38-52 and 54-59 are pending in the application. Claims 34 and 48 have been amended. No new matter has been added. Reconsideration of the claims is respectfully requested.

Rejections under 35 U.S.C. § 102

Claims 34, 36, 41-44, 46, 47-49, 51, 52, 54, 55 and 59 are rejected under 35 U.S.C. §102 (e) as being anticipated by Feldman et al. (U.S. Patent 6,061,169) (Feldman). Feldman was described in the Response filed on March 3, 2003.

Independent Claim 34

Amended claim 34 is directed to an optical system comprising a stack of at least two optical sheets. At least one of the optical sheets includes a surface replicated with both a micro-structured optical element and at least one three-dimensional optical element.

It was argued in the previous Response that Feldman fails to teach all the elements of claim 34, which argument is represented here by reference. In the present Office Action, the Examiner agrees that Feldman fails to teach a single surface that is replicated with both a micro-structured optical element and at least one three-dimensional element. The Examiner's position, however, is that claim 34 does not cover such a device, but covers "an optical sheet including a surface replicated with a micro-structured optical element and **[including]** at least one three dimensional optical element."

Applicants respectfully disagree that the scope of claim 34 is as is interpreted by the Examiner. However, in order to further prosecution forward, claim 34 has been amended to cover a surface replicated with both a micro-structured optical element and at least one three-dimensional optical element. Accordingly, it should now be unarguable by the Examiner that both elements are replicated on the same surface. The Examiner has admitted that this structure is novel over Feldman. Accordingly, this rejection should now be lifted and claim 34 found allowable.

Independent claim 48

Amended independent claim 48 is directed to an optical system that comprises a plurality of stacked optical sheets. Each of the stacked optical sheets includes at least one optical element replicated on a surface. An optical path within the plurality of stacked sheets passes from a first optical element on a first optical sheet of the plurality of stacked optical sheets to a first optical element on a second optical sheet of the plurality of stacked optical sheets. The optical path also passes from the first optical element on the second optical sheet to a second optical element on the first optical sheet.

In the current Office Action, the Examiner disagreed with the statement that Feldman fails to teach the elements of claim 48 because, broadly interpreted, claim 48 did not require that the optical path lead from the first element on the second sheet to the second element on the first sheet. Applicants do not agree with the interpretation of the claim as set forth in the Office Action. In the interests of furthering prosecution, however, claim 48 has been amended to state explicitly that the optical path leads from the first element on the second sheet to the second element on the first sheet. As was stated in the previous Response, Feldman fails to teach these elements. Instead, Feldman teaches a device in which the light is transmitted from a first sheet to a second sheet and to a third sheet.

Since Feldman fails to teach all the elements of claim 48, claim 48 is not anticipated by Feldman and is allowable thereover.

Dependent claims 36, 41-44, 46, 47, 49, 51, 52, 54, 55 and 59, which are dependent from independent claims 34 and 48, were also rejected under 35 U.S.C. §102(e) as being unpatentable over Feldman. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made in connection with independent claims 34 and 48. These dependent claims include all of the limitations of the base claim and any intervening claims, and recite additional features which further distinguish these claims from the cited references. Therefore, dependent claims 36, 41-44, 46, 47, 49, 51, 52, 54, 55 and 59 are also in condition for allowance.

Regarding claim 36, Feldman fails to teach a transmissive diffractive optical element replicated on the same surface as a three-dimensional optical element.

Regarding claim 43, Feldman fails to teach an optical sheet having an integrated spacer. Instead, Feldman teaches the use of bonding material (25) between sheets.

Regarding claim 44, Feldman fails to teach an optical path within the stack passing from a first optical element on the first optical sheet to a first optical element on the second sheet and to a second optical element on the first sheet. Instead, Feldman teaches that the light path passes from the first optical sheet to the second optical sheet and then through the third optical sheet. Feldman's optical path does not return to the first optical sheet after reaching the second optical sheet.

Regarding claim 46, Applicants respectfully assert that, although the magnetic coil is described by Feldman as an active element, it is incorrect to characterize a magnetic coil as an active optical element. Feldman's magnetic coil (63) is used for apply a magnetic field to magneto-optic media for reading and writing information to the media (col. 1, lines 17-24).

Regarding claim 47, Feldman fails to teach a passive optical element attached to a surface of one of the optical sheets. In Feldman's device, the surface of the optical sheet is shaped into a refractive or a diffractive element, and constitutes an integral part of the sheet. An optical element that is attached to the surface, on the other hand, is directed to an optical element that was not replicated from the surface of the sheet, but which existed separately from the sheet and is now attached to the sheet.

Rejections under 35 U.S.C. § 103(a)

Claims 35, 38-40, 45, 50 and 56-58 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Feldman in view of Herzig ("Micro-Optics Elements, systems and applications", published by Taylor & Francis, copyright date 1997). These references were discussed in the Response filed on March 3, 2003.

It is stated in the present office action that the 103 rejection was mischaracterized because the language of the claims does not require in any single claim both replicating a micro-scale structure with a large scale structure on one single surface. Applicants

respectfully submit that amended independent claim 34 does require that the large and small scale structures be replicated on the same surface.

In addition, Herzig fails to remedy the deficiencies of Feldman discussed above. Claims 35, 38-40, 45, 50, 56-58, which depend from independent claims 34 and 48, and which further define the inventions of allowable claims 34 and 48, are therefore also allowable.

Furthermore, Herzig states at page 169, "However, current commercial moulding technology has in general not yet reached the combination of very high resolution (less than 1 micron) and structure depth (larger than 1 micron) required by many DOE microstructures. Individually, both types of structures are routinely produced commercially." In other words, Herzig states that it is difficult to replicate structures of both high resolution and large dimension at the same time, although structures of high resolution and structures of large dimension may each be molded individually. Understanding this would lead one of ordinary skill in the art to understand that it would become even more difficult to mold a surface that contains both small sized structures and three-dimensional structures. Therefore, Herzig teaches away from the idea of combining the replication of large scale and small scale structures on the same surface and so there would be no motivation to combine the references in the manner suggested in the Office Action.

It is further stated in the present Office Action that the recitation of the optical sheet including a three dimensional optical element cannot be interpreted in terms of specific values, because every optical element taught by Feldman is a three-dimensional optical element. The Examiner is referred to page 11 of the present application, lines 7-11. There, it is stated that micro-structures formed by micro-forming techniques are referred to as two-dimensional, since the extent in the third dimension, the height, is limited to around 10 μm or less. Macroscopic cutting techniques, on the other hand, are well suited for forming optical components that have a vertical dimension of 100 μm or more, and which are referred to as three-dimensional optical elements (page 7, lines 12-20). Accordingly, not every element taught by Feldman is a three-dimensional element - those having a height of 10 μm or less are considered to be micro-structures.

Applicants respectfully contend that these claims are allowable, since there is no motivation to combine the teachings of Feldman with Herzig, and since there is no teaching of a single optical surface replicated with both a micro-structure and a three-dimensional structure in the manner claimed.

Conclusion

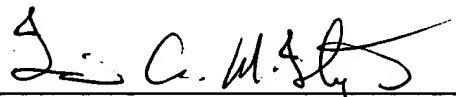
In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

Respectfully submitted,

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